

Protein Deposits: Dissolve the deposit by immersing the electrode in a 1% pepsin solution with a background of 0.1M HCL for five minutes, followed by thorough rinsing with distilled water.

If these steps fail to restore normal electrode response, replace the electrode.

SPECIFICATIONS

Offset (Asymmetry Potential):	0 mV +/- 25 mV
Response Time:	< 10 sec (95% response)
Stability:	< 3 mV drift / 24 hours
Operating Temperature Range:	variable
Operating Pressure Range:	variable
Electrode Length:	variable
Electrode Width:	variable
Cable Length:	variable

REFERENCE ELECTRODE INSTRUCTIONS

INTRODUCTION

This reference electrode comes in many styles and is designed for maximum reliability, accuracy, and ease of use. The outer body can be glass, epoxy, or other plastic materials. The reference can be refillable or permanently sealed at the factory and non-refillable. A refillable reference electrode will have one or two fill holes located near the cap at the top of the electrode. The electrode is shipped with a protective boot filled with a membrane/junction wetting agent (1:1 pH4 buffer/KCl). Crystals which may form around the protective boot in no way affect electrode performance.

PREPARATION

1. Remove the lower protective boot covering the reference junction and filled with a junction wetting agent. Rinse the electrode tip with deionized water or pH buffer. Save the booth if the electrode will be stored.
2. Sleeve junction electrode: Remove parafilm from underneath sleeve and slide glass sleeve firmly into position on tip of electrode. Measurements should be made with only lower part of sleeve immersed. For sleeve junction electrodes, when the liquid junction becomes clogged, the electrode may be flushed after loosening the sleeve. If the sleeve freezes in place, soak it in warm water to loosen it. After the sleeve is free, replenish the filling solution.
3. Reference electrodes that are refillable: Remove the rubber fill-hole plug and withdraw the plug to expose the fill-hole. For electrodes shipped with a sleeve over the fill-hole(s), slide the rubber sleeve down and remove the shipping tape to expose the fill-hole. Fill the refillable electrodes with fill solution(s) shipped with the electrode to a level just below the fill-hole(s).
4. Prior to first usage or after long-term storage, immerse the lower end of the electrode into distilled water for thirty minutes, thus preparing the liquid junction for contact with the test solution.

REQUIRED MATERIALS

Meter: This electrode will work with any pH and/or mV meter commercially available. Consult the meter instruction manual for specific details on connecting the pH meter or operating the meter.

Measuring the Electrode

Buffers: For precise electrode standardization, two buffers are required, of which one should be close to the desired sample pH. pH 7 (or 6.86 at 25°C) buffer is recommended for initial standardization followed by pH 4 (or 4.01 at 25°C) or pH 10 (or 9.18 at 25°C) buffer to span (slope) the electrode.

ELECTRODE STANDARDIZATION

Place the measuring pH electrode and reference electrode in fresh pH 7.00 (or 6.88 at 25°C) buffer and stir. Adjust the meter to read the buffer value according to the meter instruction manual.

Rinse the electrodes in distilled water and place the electrode in either fresh pH 4.01 buffer or fresh pH 10.01 buffer depending on whether the sample is acidic or basic. Stir and allow meter reading to stabilize for 30 seconds to one minute. Adjust the meter reading to the buffer value according to the meter instruction manual.

Rinse the electrodes with distilled water. Place in sample and stir. Allow meter reading to stabilize for 30 seconds to one minute. Record reading. For best accuracy, the temperature of the buffers and samples should be identical and at room temperature.

ELECTRODE STORAGE

For best results, always keep the reference junction wet, preferably in pH buffer with saturated KCl. The protective boot filled with buffer will provide an ideal storage chamber for long periods. If using a refillable reference electrode, the level of filling solution should always be kept above the internal element and preferably up to the fill hole. Do not let the electrode dry out completely.

TROUBLESHOOTING HINTS

Symptom	Possible Causes	Next Step
Out of Range Reading	defective meter	check meter with shorting plug
	defective electrodes	check electrode operation
	electrodes wired incorrectly air bubble on electrodes	check wiring connections remove electrodes and redip
Noisy or Unstable Display	defective meter	check meter with shorting plug
	solution not grounded air bubble on electrodes	ground meter and electrode remove electrodes and redip
Drift (reading slowly slowly changing in one direction)	pH bulb contaminated	see CLEANING hints
	reference clogged	see CLEANING hints
Low Slope	buffers contaminated	use fresh buffers
	pH bulb contaminated	see CLEANING hints
	reference clogged	see CLEANING hints
	defective electrodes	check electrode operation

ELECTRODE CLEANING

Electrodes which are mechanically intact with no broken parts can often be restored to normal performance by one of the following procedures:

Salt Deposits: Dissolve the deposit by immersing the electrode in 0.1 M HCL for five minutes, followed by immersion in 0.1 NaOH for five minutes, and thorough rinsing with distilled water.

Oil/Grease Films: Wash electrode pH bulb in a little detergent and water. Rinse electrode tip with distilled water.

Clogged Reference Junction: Heat a diluted KCl solution to 60-80°C. Place the reference portion of the pH electrode into the heated KCl solution for approximately 10 minutes. Allow the electrode to cool while immersed in some unheated KCl solution.